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Hip fracture prevention by screening and intervention of elderly women in Primary Health Care

Akademisk Avhandling

Som för avläggande av medicine doktorsexamen vid
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kommer att offentligen försvaras
på Avdelningen för samhällsmedicin och folkhälsa,
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fredag den 11 maj, kl. 13.00.

Av
Daniel Albertsson
Specialist i Allmänmedicin

Handledare
Professor Robert Eggertsen
Professor Dan Mellström
Med Dr Christer Petersson

Fakultetsopponent
Professor Magnus Karlsson
Universitetssjukhuset MAS, Malmö

Avhandlingen baseras på följande arbeten:

I. Albertsson D, Gause-Nilsson I, Mellstrom D, Eggertsen R. Risk group for hip fracture in elderly women identified by primary care questionnaire--clinical implications. *Ups J Med Sci.* 2006;111:179-87. (www.UJMS.se)

II. Albertsson DM, Mellstrom D, Petersson C, Eggertsen R. Validation of a 4-item score predicting hip fracture and mortality risk among elderly women. Ann Fam Med. 2007;5:48-56. (http://www.annfammed.org/cgi/reprint/5/1/48)

III. Albertsson D, Petersson C, Mellstrom D, Grahn B, Eggertsen R. Improved ability to rise and less falls among women aged over 70 at high hip fracture risk – results from an intervention study. 2007, in manuscript.

IV. Albertsson D, Mellström D, Petersson C, Thulesius H, Eggertsen R. Hip and fragility fracture prediction in elderly women: A 4-item risk score and heel BMD DXL assessment study. 2007, in manuscript.

GÖTEBORG UNIVERSITY

Department of Medicine/Public Health and Community Medicine/Primary Health Care,
Sahlgrenska Academy at Göteborg University, Göteborg, Sweden

Hip fracture prevention by screening and intervention of elderly women in Primary Health Care

Daniel Albertsson

Background – One in four Swedish women suffers a hip fracture (HF)**.** In order to identify high-risk women we developed clinical 4-item scores as the FRAMO (Fracture and Mortality) Index, evaluated heel bone mineral density (BMD) and undertook interventions to improve mobility, reduce falls and HF.

Methods - In pilot study 1998, a questionnaire regarding HF risk factors was sent to100 elderly women, with follow-up in 2001.

Based on questionnaire 2001 sent to 1498 women aged ≥70, participants were analyzed with FRAMO Index (Risk Model I) for HF, fragility fracture (FF) and mortality in 2002–2003.

A questionnaire regarding HF risk was 2003 returned by 285/435 women in the intervention population and heel BMD was assessed by portable dual X-ray laser absorptiometry (DXL), and correlated with 2-year incident HF and FF. Heel BMD was compared to hip BMD.

In the controlled cohort intervention study, 296 (I=103, C=193) women were at high risk for HF (in Risk Model II). House calls were made to 61 % in intervention group, initiating exercising and home hazard reduction. After BMD determination pharmacological treatment was considered for 80 %. We evaluated mobility outcomes from questionnaires 2001 and 2004 and incident fractures in 2004–2005.

Results - The 1998 questionnaire was answered by 92%; 34% had needs for fracture prevention. The 2001 questionnaire was returned by 83% (n=1248). Four items – age ≥80, weight <60kg, prior fragility fracture and using arms to rise from sitting - were combined in FRAMO Index. The 2-year HF risk was 0.8% for 63% with scores 0–1, and 5.4% (OR 7.5; 95%CI 3.0–18.4) for remaining 37% women with scores 2–4, having a 23.7% mortality risk. During 2004–2005, 7 HFs and 14 FFs occurred among the 285 women in intervention group, 60% of whom had heel osteoporosis (≤ -2.5 SD). The revalidated FRAMO Index showed HF OR 5.9 and FF OR 4.4. Heel BMD showed HF OR 2.7 and FF OR 2.3 for each SD decrease. Combining FRAMO Index + prior fragility fracture + low heel BMD yielded an annual HF risk of 7.8% for 11% and 0.4% for 89%.

In the intervention group, we found less women with inability to rise (OR 0.21) and fewer falls (OR 0.46) in 2004, in women with initially impaired mobility. Home exercise was more common in intervention group (RR 2.1). Women with impaired rising ability who home exercised improved (p=0.03). Three interventions seemed related to improvement in rising ability on multivariate analysis; current home exercise, calcium-vitamin D_3 treatment and previous group exercise (p=0.04–0.06). Two HFs occurred in the intervention group vs 11 in controls (OR 0.33 and p=0.23).

Conclusion – Study questionnaires were feasible in PHC. The FRAMO Index yielded good fracture and mortality prediction. Heel BMD showed increased HF and FF risk. Heel osteoporosis prevalence was high. Hip osteoporosis corresponded to a heel DXL level of around -3.3 SD. Clinical risk factors combined with very low heel BMD defined a small high risk group for HF. Intervention group subjects with impaired mobility and high HF risk improved their mobility more than controls, one year after major multi-factorial intervention. Home exercise, group exercise and calcium- vitamin D treatment seemed related to improved rising ability. This risk assessment and intervention program with 1–2 years duration appears useful in population-based HF prevention.

Key words: Hip Fracture, Fractures, Mortality, Women, Aged, Risk Factors, Risk Assessment, Accidental Falls, Questionnaires, Accident prevention, House Calls, Exercise Therapy, Drug Therapy, Bone Density, BMD, Absorptiometry, Intervention Studies, Primary Health Care, Sweden.

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